Investigating the RSLs Cytotoxicity; Possible Dependence on Micelle Size

Rikako Saito[1], Mohamed Sheikh Mohamed[1,2], Yoshikata Nakajima[3], Toru Maekawa[1,2], Toru Mizuki[1,2]

[1]Graduate School of Interdisciplinary New Science, Toyo University, [2]Bio-Nano Electronics Research Centre, Toyo University, [3]Institute for NanoScience Design, Osaka University

Rare sugars, as the name suggests, are monosaccharides that rarely exist in nature. So far, more than 50 types have been identified. These are classified as 'healthy sugars' due to their positive effects on the human body. For instance, rare sugars have been found to suppress blood sugar levels, prevent lifestyle diseases, and in some cases show anti-cancer effects too. Consequently, certain rare-sugar components have been developed for these purposes, one being Rare-Sugar Lipids (RSLs) which are promising bio-functional materials owing to their secondary structure. Micelles, a general structure of amphiphilic substances, are one of the most important entities due to their wide-ranging applications, spanning from commercial detergents to carriers in drug delivery systems (DDS). To create the most suitable micelle carrier for bio-medical applications, lot of research has been focused on their size, aggregation number, and critical micelle concentration (CMC) [1]. Therefore, it is imperative, when considering for medical applications to also investigate the role of micelle structure on the biological effects of RSLs.

Here, we have successfully synthesized RSLs using D-glucose and 6 types of rare sugars-D-allose, D-psicose, D-tagatose, L-lyxose, L-gulose, L-sorbose (the synthetic method is shown in **Figure.1**) and further investigated their toxicity profile against several types of human cells. RSLs of D-allose and D-psicose displayed nearly100% cell viability at any concentration, whereas RSLs of D-tagatose and L-sorbose showed higher toxicity against all cell types (**Figure.2**). Subsequently, we investigated their micelle size by a Zetasizer, which will be reported in my poster session.

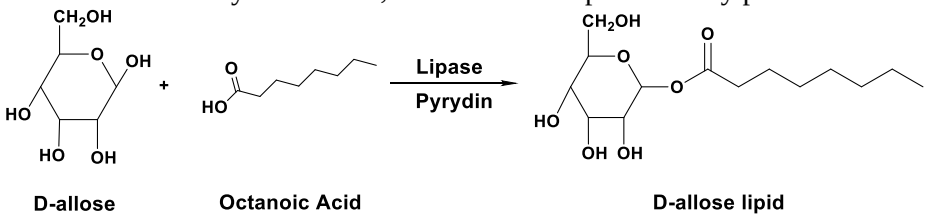

Figure1. The synthetic process of RSLs

An RSL component is synthesized with rare sugars, octanoic acid, and lipase as an enzyme.

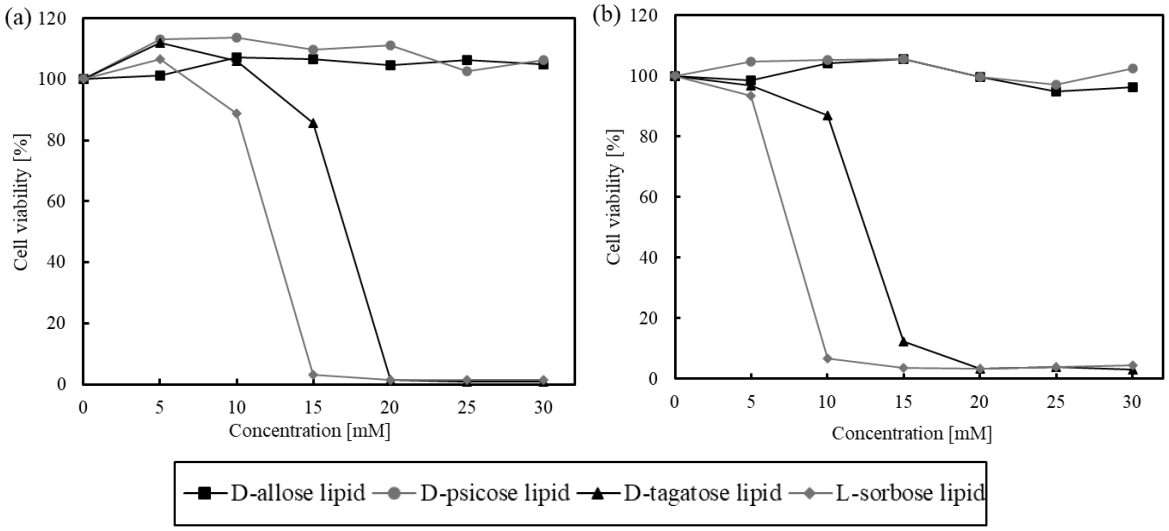

Figure2. The cell viability of (a) DLD-1, (b) CCD 841 CoN

Each type of cells was incubated for 3 hours with D-allose lipid, D-psicose lipid, D-tagatose lipid, and L-sorbose lipid. The cytotoxicity was tested by LDH assay.

Reference:

[1] Shawn C. Owen, Dianna P.Y. Chana, Molly S. Shoichet, *Nano Today*. 7, 53—65 (2012)